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north-western strike of the pitted rock, which carries it in the direction of the mountain terrace to Cabot's Head and the Manitouline islands; and secondly, for that extensive south-western strike, which affects the same stratum in another outcrop as far south as the Maumee, and sends the overlying and next subjacent rocks in a broad zone from Lake Erie across the Ohio river into Kentucky and Tennessee.

Professor Bache called the attention of the Society to a Memorial to the House of Representatives of the U. S., which had been laid on the tables, soliciting the action of Congress to effectuate the reduction of the different Astronomical Observations, which are on the files of the Navy Department, or to be found in the Transactions of different learned Societies of this country; with a view to the determination of the longitude of the Capitol at Washington, and other principal stations in the United States. Professor B. explained the views expressed in the Memorial, and invited for it the signatures of the members.

Mr. Justice mentioned, that recent observations of the moon, made by him with the great telescope at the High School Observatory, confirmed the correctness of Maedeler's map of that satellite in the parts between Aristarchus and Herodotus, which are differently represented by Dermond.

Mr. Lea, from the Publication Committee, presented their annual report, detailing their proceedings during the past year.

The number of Subscribers to the published Transactions, is at this time, 109; there have been 69 copies distributed in exchange with other Societies, &c., and 15 copies sold to non-subscribers. The balance of funds in the hands of the Committee is \$685.12.

Stated Meeting, December 17.

Present, twenty-three members.

Dr. CHAPMAN, Vice President, in the Chair.

Letters were received and read—

From the Royal Academy of Turin, dated 21st Aug. 1841, acknowledging the receipt of the Transactions and Proceed-

ings, and asking the renewed transmission of some numbers that are wanting to complete their sets:—

From the Chief of the Engineers of Mines of Russia, dated St. Petersburg, ¹⁹/₃₁st July, 1841, transmitting donations to the Library:—

From the Library Company of Philadelphia, dated 16th Nov. 1841, acknowledging the receipt of donations from the Society:—

From Mr. William Amies, dated Philadelphia, 10th Dec. 1841, making a donation to the Society of a painting emblematic of the American Union, executed in 1784, by order of M. Barbé de Marbois, and by him presented to Charles Thomson, Secretary of the American Congress; together with a copy of a Resolution of that Congress, passed 14th Jan. 1784, authenticated by Charles Thomson:—and

From Mr. John B. Murray, of New York, to the President, dated Liverpool, 19th Nov. 1841, offering to the Society's acceptance, as a donation from himself, the printing press on which Benjamin Franklin worked as a journeyman in London, in 1725–26.

The President was requested to express to Mr. Murray on behalf of the Society, the satisfaction with which they will receive the donation he has tendered.

The following donations were announced:

FOR THE LIBRARY.

Transits as observed, and Calculations of the Apparent Right Ascensions, 1834. London. 4to.—*From the Lords Commissioners of the Admiralty.*

Zenith Distances observed with the Mural Circle, and Calculation of Geocentric South Polar Distances, 1836. 4to. London.—*From the same.*

The Nautical Almanack, and Astronomical Ephemeris, for 1841. London, 1840. 8vo.—*From the same.*

Philosophical Transactions of the Royal Society of London, for the year 1841, Part I. London, 1841. 4to.—*From the Society.*
Proceedings of the Royal Society, 1841, No. 48. 8vo.—*From the same.*

Bessel's Refraction Tables. 4to. London.—*From the same.*

- Annuaire Magnétique et Météorologique du Corps des Ingénieurs des Mines de Russie, &c. &c. St. Petersburg, 1841. 4to.—*From Count Cancrine, Chef du Corps des Ingénieurs, &c. of Russia.*
- Nouveaux Mémoires de l'Académie Royale des Sciences et Belles-Lettres de Bruxelles, Tome XIII. Brussels, 1841. 4to.—*From the Academy.*
- Mémoires couronnés par l'Académie Royale, &c. de Bruxelles, Tome XIV. 2me. Partie. Brussels, 1841. 4to.—*From the same.*
- Académie Royale de Bruxelles :—Bulletins des Séances du 7 Oct. 1840, du 15 et du 16 Déc. 1840, du 6 Mars, 1841, du 3 Avr. 1841, du 6 et du 7 Mai, 1841, et du 5 Juin, 1841. Bruxelles, 1840–1841. 8vo.—*From the same.*
- Traité Élémentaire des Fonctions Elliptiques, par P. F. Verhulst, &c. &c. Brussels, 1841. 8vo.—*From the same.*
- Annuaire de l'Académie Royale de Bruxelles, 1840. Brussels, 1841. 12mo.—*From the same.*
- Annuaire de l'Observatoire Royale de Bruxelles, 1841. Brussels, 1840. 12mo.—*From the same.*
- Rapport Décennal des Travaux de l'Académie Royale de Bruxelles, depuis 1830; par Mr. A. Quetelet, Secrétaire Perpétuel, &c. 8vo. *From the Author.*
- Résumé des Observations sur la Météorologie, sur le Magnétisme, sur les Températures de la Terre, &c. &c. faites à l'Observatoire Royale de Bruxelles en 1840, par le Directeur A. Quetelet, &c. &c. Brussels, 1841. 4to.—*From the Author.*
- Additional Note on the Contraction of Voluntary Muscle in the Living Body. By William Bowman, Esq. F. R. S., Demonstrator of Anatomy, &c. London, 1841. 4to.—*From the Author.*
- A Few Notes on the History of the Discovery of the Composition of Water. By J. O. Halliwell, Esq. F. R. S. &c. London, 1840. 8vo.—*From the Author.*
- Beiträge zur Lehre von den Haulkrankheiten. Von Dr. Th. A. O. Tellkamp. Vienna, 1839. 8vo.—*From the Author.*
- Political Economy—its Uses, Objects, and Principles, &c. &c. By A. Potter, D.D. Professor, &c. in Union College. New York, 1840. 12mo.—*From the same.*
- Academy of Natural Sciences of Philadelphia : List of Members and Correspondents, to 1st Sept. 1841 : Proceedings, Vol. I. Nos. 7, 8. Oct. Nov. 1841.—*From the Academy.*
- Catalogue of the Officers and Students of Yale College. 1841–42.—*From Professor Silliman.*

Catalogue of the Officers and Students of Dartmouth College.
1841-42.—*From Professor Hubbard.*

Charter and Laws of the Philadelphia Museum Company. 1840.—
From the Company.

Reports on the Receipts and Expenditures of the County of Philadelphia, made by a Committee of the County Board, 13th Sept. 1841.—*From Mr. Vaughan.*

Professor Dunglison's Introductory Lecture to a Course of Institutes of Medicine, &c. in Jefferson Medical College, 1st Nov. 1841. Published by the Class.—*From the Author.*

Professor Meigs's Introductory Lecture to a Course on Obstetrics, in Jefferson Medical College, 4th Nov. 1841. Published by the Class.—*From the Author.*

Two Sermons on the Death of the Rev. Ezra Ripley, D.D. By Rev. Barzillai Frost and Rev. Convers Francis, D.D. Boston, 1841.
From Rev. Mr. Frost.

The American Library and Intelligencer. New Series. Vol. I. No. 5. By Robley Dunglison, M.D. &c. &c. Nov. 1841.—
From the Author.

FOR THE CABINET.

A Painting emblematic of the Union of the American States, executed 1784.—*From Mr. Wm. Amies.*

A Broad Sheet Copy of the Resolution of the Continental Congress, passed 14th January, 1784; authenticated by the autograph of Charles Thomson, Secretary.—*From the same.*

The Committee, consisting of Mr. Lea, Dr. Wood, and Professor Booth, to whom Mr. Nuttall's communication was referred at the last meeting, reported in favour of its publication among the Transactions; and it was ordered accordingly.

Mr. Espy exhibited an instrument, devised by himself, and which he calls the Nephelescope, intended to show the changes induced in the temperature of air by its greater or less rarefaction; and made several experiments with it in the presence of the Society.

Mr. Espy showed, that he was enabled by this instrument to determine the reduction of temperature, which air undergoes by expansion, whether in a dry state or when charged with moisture. He called attention to the cloud which was formed in moist air by the cold of expansion, and remarked that the latent heat evolved by this conden-

sation of vapour, counteracted the reduction of temperature produced by the expansion in a ratio which increased with the increase of temperature. Thus, he stated as the result of experiments, that an expansion occurring in air saturated with aqueous vapour, at a temperature of about 71° , produced an increase of temperature half as great as in dry air; and at a temperature of 102° , a similar expansion increased the temperature only one third as much as when the air was dry.

Mr. Espy went on to show, that by experiments made with this instrument, he had been able to make out a law, from which, when the temperature of the air and the dew point at the surface of the earth under the base of a forming cloud are known, the decrease of temperature can be determined up to the base of the cloud, and even to its top, though that should be ten miles high, as some great clouds in the summer are. And as the temperature of the air on the outside of the cloud is nearly known, being about one degree colder for every hundred yards in height, the specific gravity of the cloud can be known, when compared with that of the air surrounding it. Mr. Espy entered into a calculation to show that the air under the base of a forming cloud is colder about one degree and a quarter for every hundred yards above the surface of the earth, and that from the base of the cloud upwards it gets colder about one degree and a quarter for each two hundred yards of increased elevation. This calculation is founded on the supposition that there is an up-moving column of air under and in every forming cloud, as established in his **PHILOSOPHY OF STORMS**.

Mr. Espy went on to state, that it is ascertained, both by experiments made with the nephelescope and by calculations founded on the well known laws of latent heat in vapour, and specific caloric of air, that the latent caloric, given out into air by the vapour which condenses into cloud, expands the air in the cloud about 8000 cubic feet for every cubic foot of water generated in the cloud; and it is known, that it requires about 1300 cubic feet of vapour in the air to make one cubic foot of water. The difference between these quantities, or 6700 cubic feet, is therefore the actual expansion for every cubic foot of water generated from the condensing vapour. This great expansion of the air in a forming cloud, should evidently cause the air to spread out above, around the cloud, causing the barometer to rise around it, by the increased quantity of gravitating matter, and also causing the barometer to fall under the cloud, especially near the middle of the base of the ascending column, as it is known to do under great storm-clouds.

It was a remarkable fact, he said, in the history of science, that no one had adverted to a deduction from the laws of dynamics, which he deemed incontrovertible, that the wind must blow inwards on all sides of a storm, since the barometer is known always to stand low at the centre, sometimes more than two inches lower than the mean: and he went on to show that, in narrow spouts or tornadoes, where the friction of the air at the surface of the earth may be neglected, the air, following the law of spouting fluids, would spout upwards with a velocity of 240 feet per second, if the barometer should fall only one inch; and so in proportion to the square root of the fall.

Mr. Espy stated that experiments had been made, both in Great Britain and France, on dry air, similar to those which he had made with his nepheloscope; but none, he believed, had ever been made with moist air, so as to compare the results together.

Finally, Mr. Espy gave a brief summary of the principles of his theory. When the air becomes heated or highly charged with vapour at the surface of the earth, it becomes lighter, and ascends in columns, comes under less pressure, expands, becomes colder by expansion, begins to condense its vapour into water or cloud, when it becomes as cold as the dew point; which it will do when it rises as many hundred yards as the dew point is below the temperature of the air in degrees of Fahr.; and the higher it goes the more vapour will it condense, the more latent heat will it give out, and the more will the cloud expand by the latent heat evolved. The more also will the barometer fall under the cloud: this will cause the air to rush towards the centre of the ascending column, where the barometer stands low: the air thus rushing in will ascend and form cloud as before, and thus the process will be continued as long as air continues to come in, highly charged with vapour. And as the storm-cloud moves over the surface of the earth, the air around is thus pressed in towards the centre of the region under the cloud, and upwards into the cloud, in consequence of the diminished specific gravity of the air.

The Committee of Finance presented the Treasurer's accounts, with their annual report thereon; and the appropriations for the service of the coming year were made, in accordance with the recommendation of the Committee.

On motion of Dr. Patterson, additional authority was conferred on the Committee appointed on the 9th of August last, to make leases, &c. of the Museum Building.